CHAPTER 14 - Preparation of Project Plans

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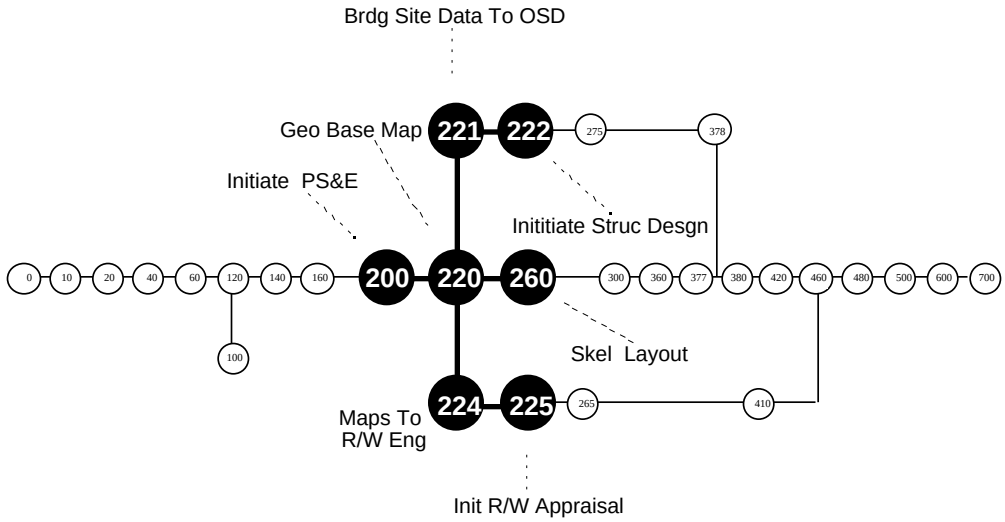
SECTION 1 - Preliminary Plans



This section of the PDPM discusses the project development workflow tasks between Milestones 200 and 260. For details on these tasks, see the *Project Development Workflow Tasks Manual*.

ARTICLE 1 - General

Initiate Project Design

The design phase of the project development process involves the preparation of Plans, Specifications, and Estimates (PS&E) for the construction of a transportation improvement project.

Project design is initiated by obtaining a 1-phase (design) Expenditure Authorization (EA) at project approval. Because the development of cost estimates and design alternatives is required for project approval, a significant portion of the project design is often completed prior to the formal initiation of the design phase. When design is done by a consultant this is referred to as 35% plans.

The main activities in producing a preliminary set of plans are the completion of geometric base maps, the submittal of structure site data, the submittal of maps to Right of Way, and the circulation of skeleton layouts.

The Project Engineer's (PE) responsibilities during the design process include the following:

- Prepare quality plans that meet Caltrans standards, practices, and policies.

- Prepare project cost estimates and monitor costs to keep the project within budget.

- Utilize available resources to maintain project schedules.

- Monitor the project scope to ensure consistency with previous approvals.

- Inform the Project Manager (PM) of any cost, scope, or schedule changes that may be required for the project.

Revisions to the scope, schedule or cost of a project require a Project Change Request. If the change in scope is significant, a Supplemental Project Report and an environmental reassessment may be needed. The project plans must otherwise be consistent with the project description identified during the environmental studies.

Request Additional Data

Project design requires the continuous review and update of data. Examples of information that should be obtained for the development of preliminary plans are listed below.

- Mapping and Survey Data

  With input from the functional units, the PE requests the Surveys Unit to conduct any field surveys required to accomplish the design of the project. The District Surveys Unit is also responsible for coordinating with the Headquarters Photogrammetry Section to provide any required topographic mapping.

- Materials Report

  The Materials Report is prepared by the District Materials Unit to determine pavement structural sections and to recommend slopes for excavation and embankment. Concurrence should be obtained from local agencies for the design of structural sections on local streets and roads. Topics discussed in the report may also include slope stability, seismic considerations, availability of materials, and other related information.

- Drainage Report

  The Drainage Report is usually prepared by the Hydraulics Unit, to establish basic drainage requirements and to allow for the early design of box culverts, sanitary sewers, cross drainage, and other drainage facilities. Drainage designs should be reviewed by the Maintenance Unit and local agencies as appropriate.

- Traffic Data

  Updated traffic projections and Design Designations should be requested from the Planning Branch. These are used to verify that the capacity and other operational characteristics of the proposed improvements are adequate for the design year. Traffic volumes are also required to calculate the Equivalent Single-Axle Load (ESAL) and Traffic Index, which both determine the design of the pavement structural section.

Special Considerations

During the initial stages of the project design process, various project-related activities should be initiated and monitored. Areas to consider include:

- Impact mitigation for historical structures and biological features
- Relinquishment and abandonment procedures
- Freeway Agreements with local agencies
- CTC Route Adoptions or CTC consent to new public road connections
- Foundation investigations, retaining walls, and noise barriers
- Cooperative Agreement for construction oversight
- Maintenance Agreements for responsibility after construction
- Hazardous waste
- Permits
- Railroad involvement
- Bus-loading facilities

Recycling should be incorporated into the project whenever appropriate; available hardware may be found in the State-wide inventory of salvaged highway hardware. In addition, all contracts should identify highway hardware and other material that has the potential for reuse or salvage, rather than disposal.

Experimental Features

The PE may be requested to use an experimental feature on the project. This request could come from within or from outside of Caltrans, or it may come about through the initiative of the PE. A feature is, generally, considered experimental whenever a nonstandard item or process or a proprietary product is specified. For the FHWA to participate in the cost of the experimental feature they must approve a

work plan describing the experimental feature and illustrating how Caltrans will construct it and evaluate its performance under the Construction-Evaluated (C-E) program. The C-E program's intent is to field test the constructability and performance of promising new products, techniques, and methods relating to highway facilities. Refer to Section 2-04 of the *Construction Manual* for further information.

To obtain federal approval for an experimental feature to be included as a contract item, a finalized work plan should be submitted to the Resource Conservation Branch of the Design and Local Programs Program a minimum of four weeks prior to project advertisement. Since site suitability is often a key factor, agreement with the Headquarters unit responsible for that functional area should be obtained prior to submittal. Although not the preferred method, an experimental feature can be included as a "contract change order" on an ongoing contract.

If a proprietary item is involved, approval must be obtained from the District Director or designee; all requests on structure items must be approved by the Chief, Division of Structures. Copies of the approval letters must be attached to the workplan when submitted to Design and Local Programs Program (DLPP), Attention: Proprietary Item Workplan. Refer to Section 602.1 (6) of the *Highway Design Manual* (HDM) for further information.

ARTICLE 2 - Geometric Base Maps

Development of Geometric Base Maps

A Preferred Alternative was selected during the project approval process and must now be refined to produce geometric base maps, typical sections, and profiles. Preferably, the development of alternatives was performed using controlled aerial mapping, which can easily be transformed into geometric base maps.

For some projects, as-built plans or photo mosaics may be sufficient. The geometric base maps must show existing topography and proposed engineering features. Accurate mapping is needed for all subsequent design activities, such as determining right of way needs, designing drainage facilities, developing traffic plans, etc.

While preparing the base maps, it is appropriate to update the strip map developed during earlier project studies. The strip map is distributed as an attachment to requests for project data and other correspondence.

Review by Functional Units

Geometric base maps should be sent to appropriate functional units to identify problems that are easier to correct at early stages of design and to establish a foundation for skeleton layouts. Comments from Maintenance, Hydraulics, Landscape Architecture, Structures (to determine railroad involvement and easement requirements), and Traffic are particularly useful.

Review by External Agencies

Contacts with external organizations were initiated earlier in the project development process; these relationships should be maintained throughout the design process. Local agencies should be allowed an opportunity to review the geometric base maps and to comment on the design of frontage roads, intersections, and other local facilities.

Coordination should also be maintained with any affected agencies that issue permits, such as the State Lands Commission, U.S. Coast Guard, State and local Reclamation Boards, California Department of Fish and Game, Regional Water Quality Control Board, U.S. Army Corps of Engineers, Department of Parks and Recreation, etc. To facilitate the permit process, these agencies should be encouraged to perform an early review of the geometric base maps.

Design Approvals

The determination of final vertical and horizontal alignment is necessary for the completion of geometric base maps. At this stage, interchange and intersection details have also been established, and all preliminary geometrics should be reviewed by the PM prior to finalizing the maps. Comments on the geometric base maps should be requested from the DLPP Geometric Reviewer and PD Coordinator, and the approval of any additional proposed exceptions to Mandatory Design Standards must be obtained. For projects on the Interstate System with construction costs exceeding $1 million, and for projects involving special structures as defined in Chapter 2, Section 7, a review of the geometric base maps and the preliminary design should also be requested from the FHWA Transportation Engineer.

ARTICLE 3 - Bridge Site Data Submittal

Prepare Site Plans

The Office of Structure Design (OSD) of the Division of Structures (DOS) of the Engineering Service Center (ESC) is responsible for the design of all bridges, pumping plants, pedestrian structures, and nonstandard retaining walls, noise barriers, culverts, and other highway and transit related structures. A site plan must be prepared for each structure and submitted to OSD using standard forms. (Contact the ESC Project Functional Manager for preparation guidance and see Appendix KK for sample Bridge Site Data Submittal forms.) The site plans should include survey base lines, alignments, profiles, typical cross sections, bench marks, proposed geometrics, and topography. The submittal is not considered complete until all data is supplied accurately. Four copies of the Bridge Site Data Submittal should be sent to the Office of Program and Project Management in the Engineering Service Center. For additional details, see the *Drafting and Plans Manual*.

Structure Preliminary Report

After receiving the Bridge Site Data Submittal, OSD prepares the Structure Preliminary Report (and a preliminary foundation site plan, if needed) describing the design features for the structure. The report is sent to the district for review to ensure compliance with the project's geometric requirements. After the district's comments are incorporated, structures design is initiated.

ARTICLE 4 - Right of Way Submittal

Determine Right of Way Requirements

During the project approval process, the R/W Data Sheet was prepared using preliminary maps, assessor's maps, record maps, and property ownership maps. However, substantial changes to right of way requirements can occur during the design phase. After geometric design features have been completed, slope catch lines are plotted on the geometric base maps, and right of way requirements are established according to the minimum offsets described in the HDM. When determining right of way widths, reasonable allowances should be made for possible future design revisions. In addition, easements may be required for maintenance access, drainage, noise barriers, material sites, utilities, construction work areas, etc.

Send Maps to Right of Way

After right of way requirements are determined, geometric base maps describing the requirements are submitted to Right of Way Engineering to provide a basis for the appraisal process

Prepare Appraisal Maps

The geometric base maps are used to order title reports and prepare appraisal maps. The appraisal maps indicate the sizes of the parcel takes and remainders, and show engineering details that may affect property appraisal values, such as fences, gates, water wells and driveways. Other map items include potential excess lands (for construction detours, contractor's yards, etc.) and government easements (for improvements on U. S. Forest Service land, etc.).

Certificate of Sufficiency

The completed right of way appraisal maps are reviewed by the PE to verify that the designated right of way lines are required to construct the project. A Certificate of Sufficiency and Hazardous Waste relating to the parcels contained in a single Appraisal Report is then requested by the Right of Way Branch and signed by the PE, the PM, and the District Division Chief for Design.

Initiate Right of Way Appraisals

After appraisal maps are certified and the appraisal process is initiated, the Right of Way Branch establishes the fair market value of required parcels, which determines the offers made to parcel owners.

ARTICLE 5 - Skeleton Layouts

Circulate Skeleton Layouts

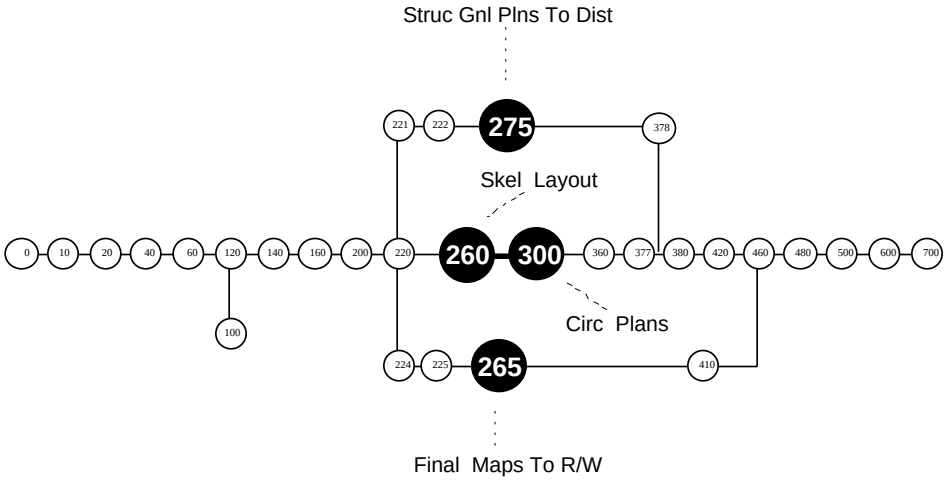
The skeleton layouts consist of geometric base maps showing topography, proposed geometric features, and right of way. The layouts are divided into plan-sized sheets (with no overlapping details) and distributed to the functional units for use in developing their portion of the PS&E. Pavement delineation, drainage, planting and irrigation, and other work may be superimposed on the skeleton layouts to produce special-purpose plan sheets.

Typical Cross Sections

To provide complete information, typical cross sections are prepared and accompany all skeleton layouts.

Typical cross sections are based on details provided in the Project Report and the Materials Report. After typical cross sections are circulated to the district functional units for comments, they are submitted to the District Director (or designee) for approval in accordance with the requirements of Index 602.1 of the HDM. A copy of the approved typical cross section must be transmitted to DLPP, Attention: Typical Section, for information.

SECTION 2 - Final Plans



This section of the PDPM discusses the project development workflow tasks between Milestones 260 and 300. For details on these tasks, see the *Project Development Workflow Tasks Manual*.

ARTICLE 1 - General

Conduct Detailed Project Design

Skeleton layouts were previously distributed to applicable functional units. They are now utilized to prepare final plans. Quantity calculations, contract specifications, and other elements of detailed design must also be completed at this stage. After the functional units deliver their portions of the PS&E, the Project Engineer (PE) consolidates the plans and circulates them within the district for review.

Special Considerations

As final plans near completion, it should be confirmed that all special considerations for the project are being resolved. These considerations may include the following:

- Hazardous waste cleanup
- Railroad Agreements
- Approval of material and disposal sites
- Water well abandonment procedures
- Aesthetics review
- Transportation Management Plan
- Environmental Mitigation Commitments

ARTICLE 2 - Final Maps to Right of Way

Final R/W Requirements

Right of way (R/W) requirements were submitted after the completion of the geometric base maps, but design refinements may result in changes to these requirements. If necessary, updated maps should be sent to Right of Way so that appraisal maps can be revised to reflect the additional or modified parcels or easements.

Acquisition & Clearance

The Right of Way Branch begins the acquisition process for each parcel as soon as the appraisal of that parcel has been completed. When the appraisals of the last additional or modified parcels are completed, the acquisition of those parcels is begun. Clearance of improvements is accomplished by the implementation of a Property Management Plan, which is prepared by the Right of Way Branch. Basic elements of the plan include the following:

- Issue 90-day relocation notices to the property owners to vacate their property.
- Initiate and implement sale of buildings and provide necessary monitoring to ensure that clearance is timely.
- Perform demolition and clearance contracts, as necessary.

If required, a Relocation Assistance Plan will be implemented.

Condemnation Procedures

If negotiations with a property owner have been unsuccessful, the condemnation process may be initiated. Condemnation of property through eminent domain is initiated through a Resolution of Necessity, which is requested from the CTC. (See Chapter 28 for details.) Following the CTC's adoption of the Resolution of Necessity, Orders of Possessions must be acquired from the courts to provide for possession after 90 days.

ARTICLE 3 - Bridge General Plans

Bridge General Plans

The Bridge Site Data submittal and the Structures Preliminary Report are used to prepare the Bridge General Plans. The plans provide a description of the bridge type, dimensions, aesthetics treatment, and cost estimates. The Office of Structure Design (OSD) transmits the plans to the district for review before continuing with detailed structure design.

Falsework Approval

The PE should review the General Plan falsework openings for conformity to current standards. Nonstandard vertical falsework clearances must be approved by the PD Coordinator. Nonstandard horizontal clearances require approval of the District Director, with concurrence from the PD Coordinator. If bridge construction involves falsework on local streets or roads, concurrence should be requested from the local agency. For more information on falsework, see the *Highway Design Manual,* Index 204.6.

Development of Bridge PS&E

After the PE's concurrence is obtained for the Bridge General Plan, the development of bridge plans and quantity calculations can begin. Foundation studies are conducted by the OSD, in conjunction with the Structure Foundations Branch, of the Office of Structural Foundations of the Engineering Service Center. The Structure Foundation Report and other information are used to develop the bridge unchecked detail sheets. These details are again reviewed by the district before OSD proceeds with the preparation of the Bridge PS&E.

ARTICLE 4 - The Project Plans

Plans Prepared by Project Engineer

Project plan preparation complies with the standards set forth in the *Project Plan Preparation Manual*, which is a reproduction of Chapter 4 of the *Drafting and Plans Manual*. Computer-aided Design and Drafting (CADD) should be utilized to the maximum for project plan preparation and should conform to the standards and procedures contained in the *CADD Users Manual*.

The PE prepares the majority of the project plans. These usually include the layout sheets, typical cross sections, profile sheets, construction details, drainage sheets, quantity summary sheets, etc.

Plans Prepared by Functional Units

The following are examples of plans prepared by the functional units:

- Landscape Architecture prepares plans for new and replacement planting, irrigation crossovers and systems, electrical service for automatic irrigation systems, environmental mitigation planting, erosion control, etc.

- Traffic prepares plans for pavement delineation, construction area signs, traffic handling (including staging and detours), etc.

- Traffic Electrical prepares plans for signal and illumination, power supply, and railroad electrical requirements.

- Utilities prepares plans for relocation of utilities during the construction contract.

ARTICLE 5 - Final Quantities

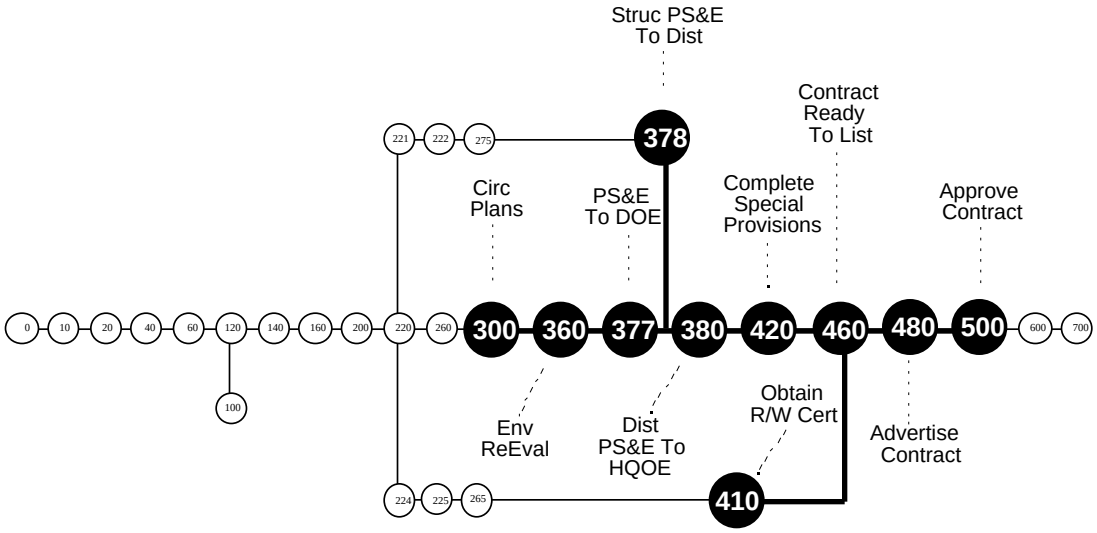
Quantity Calculations

Project cost estimates are continuously updated throughout the project development process. As more information becomes available, specific contract items of work are identified. The quantities of these items are calculated and tabulated on a plan sheet labeled "Summary of Quantities".

Unit Price Analysis

Project cost estimates should represent the fair and reasonable price the State should expect to pay for each item of work to be performed. Determining appropriate unit prices for individual contract items requires an analysis of recent bid prices for similar projects or an analysis of current labor, equipment, and materials costs. The District Office Engineer Unit can provide bid summaries, the Contract Items by Item Number Report, annual cost data books, and other relevant information. (For more information, see Appendix BB, "Project Development Cost Estimates".) After final quantities and unit prices are determined, they should be entered into the Basic Engineering Estimating System (BEES).

SECTION 3 - PS&E Submittal



This section of the PDPM discusses the project development workflow tasks between Milestones 300 and 500. For details on these tasks, see the *Project Development Workflow Tasks Manual*.

ARTICLE 1 - General

Complete Project Design

The Project Engineer (PE) works with the District Office Engineer (DOE) Unit to prepare the Plans, Specifications, & Estimate (PS&E) Package, which is then submitted to the Engineering Service Center Office of Office Engineer (ESC-OOE) for eventual contract advertising. For greater detail, see the *PS&E Guide.*

Review for Current Standards

Revisions to design standards, *Standard Plans*, and Standard Special Provisions are issued with a stated effective date, after which the new or revised standards will be followed. The design standard revisions are issued with a Change Transmittal Memorandum that identifies any revisions which involve special implementation procedures requiring mandatory implementation as late as completion of construction.

In general, revisions to design standards in the *Highway Design Manual, Traffic Manual, Bridge Manuals,* Design Bulletins, and Interim Manual Changes that may be issued by Caltrans, must be included in the PS&E prior to submittal to Headquarters Office Engineer. Refer to the *Highway Design Manual* Index 82.5 for more information on the effective date for implementing revisions to design standards.

Use of Standard Plans

The *Standard Plans* will not cover each and every condition; and therefore, revisions will occasionally be required in order to fit the given situation. When making modifications, keep in mind the priority of documents as stated in the *Standard Specifications* Section 5-1.04, "Project plans shall govern over Standard Plans; Standard Plans and project plans shall govern over these Standard Specifications; the Special Provisions shall govern over both these Standard Specifications and the plans".

The following process should be followed anytime a deviation from the *Standard Plans* is required: (Note: for Bridge items - see the *Bridge Design Details Manual* for additional requirements.)

- A detail drawing will be added to the project plans which will entirely supersede the Standard Plan.

  OR

  A detail drawing will be added to the applicable detail sheet of the project plans with a note indicating which portion of the Standard Plan is being superseded and that Standard Plan will be checked on the Standard Plan checklist.

  OR

  A statement will be added to the Special Provisions indicating which portion of the Standard Plan does not apply and that Standard Plan will be checked on the Standard Plan checklist.

- The Project Engineer should seek review and concurrence by the PD Coordinator, Traffic Liaison or ESC Project Functional Manager, the Headquarters functional unit, or the Program Advisor, and their Senior Design Engineer. A memo to file should be placed in the project file for significant deviations to preserve the reasoning behind the engineering decisions being made.

- When submitting the PS&E package to Engineering Service Center Office of Office Engineer, the Project Engineer should note in the Attachment A of the transmittal memo that the deviation of the Standard Plan has been reviewed and concurred by the PD Coordinator, Traffic Liaison or ESC Project Functional Manager.

Local Agency Review

Local agencies have had opportunities to review and comment on the project throughout the project development process. Their comments should be minimal at the final stage of design. The PS&E package should be sent to the local agency staff for final review and concurrence. Any appropriate changes should be incorporated. Particular attention should be given to comments from the local agency on construction road closures and on improvements to facilities that will eventually be relinquished to them.

FHWA Review

FHWA may have been involved with various reviews and approvals throughout the life of the project. At the PS&E stage, all projects on the Interstate System (except resurfacing, restoration, rehabilitation [RRR] projects) require final approval via submittal of a draft standard form (FNM76) to the DOE, who forwards it to the HQ Office of Federal Resources and Grants.

Safety Review

The District Safety Committee is responsible for reviewing all projects for safety compliance to standards. After reviewing the PS&E package, the Committee prepares a Safety Report or letter. Appropriate reference should be included in the PS&E submittal. See the *Highway Design Manual,* Index 110.7 for details.

Review for New or Revised Standards

Revisions to design Standards are issued from time to time and have a stated effective date. Project will be designed to current standards unless an exception is approved. Refer to the HDM, Index 82.5, for details.

Funds Request

All State-funded projects, except "Minor B" projects, have funding approved by vote of the CTC. A project's funds request should be reviewed by appropriate district units and signed by the District Division Chief for Program/Project Management. The request is sent to the Budgets Program, which administers the voting process and submits the request to the CTC.

If highway planting is to be installed as a separate contract, it is to be funded from the parent highway project at the time the parent project is voted by the CTC and PS&E scheduled.

ARTICLE 2 - Environmental Reevaluation

Environmental Reevaluation Process

The Environmental Reevaluation process (PYPSCAN Milestone 360) was established to confirm that the conclusions in the Final environmental document remain valid. Changes to the project during design, changes in environmental impacts, or changes in environmental laws, may cause impacts not addressed in the original document and may require additional environmental study, documentation, and mitigation. Examples include expanded hazardous waste identified during cleanup operations, additional right of way requirements to accommodate for slope stability, unanticipated drainage considerations, or the listing as a Federal endangered species of a new species that may be impacted.

The Environmental Unit reviews the project for environmental compliance to allow the PS&E development process to continue if no significant additional impacts are identified. The Reevaluation should be documented in the PS&E package.

Permits

The Environmental Reevaluation should include a review of the permits required from regulatory agencies. The review should verify that all permits have been issued, that they are still compatible with the proposed construction, and that expiration dates are current.

Mitigation

Impact mitigation measures should be incorporated into the various portions of the PS&E. A review of the PS&E for environmental commitments, hazardous waste remediation, and material sites should also be included in the Environmental Reevaluation.

ARTICLE 3 - Right of Way Certification

Request R/W Certification

Before a construction project can be advertised, the Right of Way Branch must certify that the right of way has been acquired. All projects require certification, even if no new right of way is involved.

If appropriate, the PE should also request the District Railroad Liaison in Right of Way to obtain a Railroad Clearance memorandum from the Division of Structures. After the clearance memorandum is received, the Right of Way Branch certifies the right of way.

Types of Certification

The three types of right of way certification are defined below. A project can be advertised with a Certification No. 3, but it must be upgraded to a No. 1 or No. 2 three weeks prior to bid opening.

- No. 1 Certification indicates that all property has been acquired.
- No. 2 Certification indicates that all property has been acquired or that Orders for Possession have been obtained.
- No 3 or No. 3 Workaround Certification indicates that the right of way process is in order, but acquisition or Orders for Possession will not be completed until a certain date.

ARTICLE 4 - Preparation of Contract Documents

Submittal to District Office Engineer

After incorporating comments collected during district circulation, the PE completes the draft PS&E package and forwards it to the DOE unit (see *PS&E Guide)*. Some of the items included in the package are listed below:

- Cover Memorandum
- Attachment "A" – a summary of the status of external constraints (permits, agreements, etc.)
- Special Provisions (in some districts, the special provisions are compiled by DOE)
- BEES cost estimate
- Right of Way Certification
- District Drafting Plan Review Checklist
- Copy of Request for Funds
- PS&E CADD submittal form
- Railroad clauses
- Copies of permits and agreements
- Project Plans

The DOE unit is responsible for ensuring the completeness, quality and consistency of all PS&E packages. After combining the Structures and District portions of the PS&E, DOE finalizes the package and submits it to ESC-OOE for processing. Structures final contract tracings or electronic files are submitted to ESC-OOE by the Office of Structures Design upon two week notice from the DOE.

Submittal to HQ Office Engineer

The preparation of the draft contract documents can follow one of two procedures, depending on the qualifications of the DOE relative to the cost of the project.

(1) For projects that are "qualified", the DOE prepares the draft contract documents, circulates them within the district, reconciles the comments, and submits the final contract documents to HQ for advertising. This procedure is meant to streamline the advertising process.

(2) For "nonqualified" projects, the PS&E is transmitted to the ESC-OOE. The draft contract documents are prepared in HQ and then returned to the district. After review and reconciliation, the documents are returned to HQ for finalizing and preparation for advertising. For further information, see the *PS&E Guide.*